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Studies in Applied Finance

**INVESTMENT THESIS FOR
KITE PHARMA, INC.
(NASDAQ: KITE)**

Samantha Semenkow

Johns Hopkins Institute for Applied Economics,
Global Health, and the Study of Business Enterprise



Investment Thesis for Kite Pharma, Inc. (Nasdaq: KITE)

By Samantha Semenkow

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About the Series

The Studies in Applied Finance series is under the direction of Professor Steve H. Hanke (hanke@jhu.edu), Co-director of The Johns Hopkins Institute for Applied Economics, Global Health, and the Study of Business Enterprise, and Dr. Hesam Motlagh (hesamnmotlagh@gmail.com), a Fellow at the Johns Hopkins Institute for Applied Economics, Global Health, and the Study of Business Enterprise.

This working paper is one in a series on Applied Financial Economics that focuses on company valuations. The authors are mainly students at The Johns Hopkins University and The Johns Hopkins School of Medicine in Baltimore, MD who have conducted their work at the institute as undergraduate and graduate researchers.

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JEL Codes: C63, G11

Investment Thesis for Kite Pharma, Inc. (Nasdaq: KITE)



Rating: BUY- Target Net Present Value per Share \$85.30

Company Name	Kite Pharma, Inc.
Date	12/8/16
Current Price	\$45.07
2016 Fiscal Year End	12/31/16 (Currently in Q4)
52 Week Range	\$38.41-\$69.50
Market Cap	\$2,247.9 Billion
Enterprise Value	\$1,770.8 Billion
Total Debt	\$0
Cash	\$477.1 Million
Dividend	N/A
Diluted Shares Outstanding	49,624,622
2017 EPS (Est.)*	-\$5.67
2016 EPS (Est.)*	-\$4.46
2015 EPS	-\$2.33
2014 EPS	-\$1.91
2013 EPS	-\$1.43

*Based on consensus estimates as of market close on 12-8-16 (Source: Bloomberg Terminal)

Table of Contents

Executive Summary:	4
Catalysts and Risks:	4
Company Overview:	5
<i>Drug Pipeline:</i>	5
<i>Acquisitions, Collaborations and Partnerships:</i>	6
Business Model:	6
<i>eACT Design and Manufacturing:</i>	6
<i>B-cell Malignancies:</i>	8
<i>Clinical Trial Results:</i>	9
<i>Future Innovation:</i>	10
Competition:	11
Historical Performance:	12
Pre-Profit Biotechnology Model:	14
<i>Income Statement and Balance Sheet Trends:</i>	15
<i>Modeling FDA Regulatory Approval:</i>	16
<i>Revenue Growth Projections:</i>	18
<i>Expenses Projections:</i>	20
<i>Net Present Value (NPV) Model:</i>	21
<i>Model Results:</i>	21
Proxy Report:	24
<i>Management Experience:</i>	24
<i>Executive Compensation:</i>	25
<i>Insider Shareholders and Trading:</i>	28
Conclusions:	30
Appendix A: Partnerships and Collaborations	31
Appendix B: Beta Distributions	32
Appendix C: Analyst Recommendations.....	34

Executive Summary:

Kite Pharma, Inc. is a pre-profit biotechnology company focused on developing genetically engineered T-cell therapies designed to target and remove cancerous cells. Using a proprietary discounted net present value (NPV) model, assumptions based on the Federal Drug Administration (FDA) approval timeline, independent analysis of market share penetration, and management guidance, we have concluded that Kite Pharma is undervalued with a potential upside of 89.25% based on the target price of \$85.30. Despite the large amount of uncertainty regarding the FDA approval process, our analysis anticipates that Kite Pharma's lead product KTE-C19 will receive FDA approval for treatment of relapsed/refractory Diffuse Large B-Cell Lymphoma (DLBCL) based on positive clinical trial results in a patient population with no further treatment options. Additionally, the T-cell therapy may provide a general platform for treatment of other ailments not explicitly included in our NPV analysis. Ultimately, we recommend Kite Pharma a **BUY** with a target price of \$85.30.

Catalysts and Risks:

- Kite Pharma's leading product (KTE-C19) has received breakthrough therapy and orphan drug designations from the FDA and the European Medicines Agency (EMA).
- Positive interim data in the ZUMA-1 Phase 2/3 clinical trial were reported in September 2016.
- A rolling Biologics License Application (BLA) has been submitted to the FDA for KTE-C19 for relapsed/refractory DLBCL. BLA submission is expected to be completed during the first quarter of 2017.
- KTE-C19 has the potential to be a first to market product (i.e. the first to begin BLA submission process for an engineered T-cell therapy).
- Several clinical and pre-clinical products in the pipeline are advancing in development.
- Numerous partnerships and collaborations dedicated to increasing research and development efforts have been forged.
- Kite Pharma has purchased a facility in El Segundo, CA designated for manufacturing T-cells therapies in preparation for commercialization.
- Severe side effects in patients receiving treatment with KTE-C19 have been reported during clinical trials, which may influence the FDA's recommendation.
- FDA approval is not guaranteed. It is dependent upon drug efficacy, and the ability to successfully and safely manufacture the therapy.
- There is significant competition from other companies developing the same or similar technologies.
- Political agendas against high pharmaceutical pricing may affect the company and the biotechnology sector.

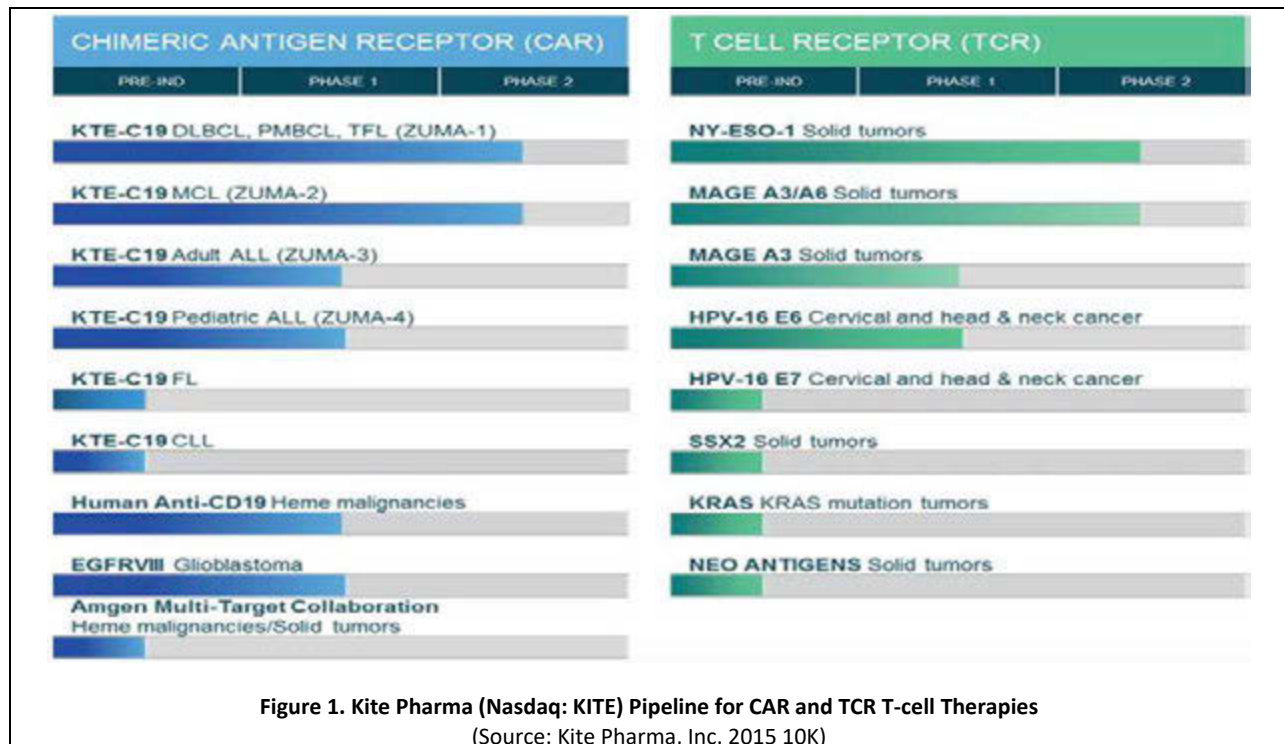
Company Overview:

Kite Pharma, Inc. is a pre-profit biotechnology company developing novel cancer immunotherapies through genetically engineering a patient's own immune system to specifically target cancerous cells. Kite Pharma was incorporated in June 2009 in Delaware and is currently headquartered in Santa Monica, CA. The company went public on June 20th, 2014 and began trading under the ticker KITE on the Nasdaq Stock Market.

Drug Pipeline

Kite Pharma is developing two types of engineered T-cell therapies: Chimeric Antigen Receptor (CAR) and T-cell Receptor (TCR) T-cells. Their pipeline boasts several candidates that are already in clinical trials or are close to being filed as investigational new drugs (IND) as summarized in Figure 1.

KTE-C19, Kite Pharma's lead product, is currently in Phase 1/2 and 2/3 clinical trials and has been granted breakthrough therapy and orphan drug status by the FDA and EMA to treat aggressive forms of relapsed/refractory Non Hodgkin Lymphoma (NHL). The breakthrough therapy designation allowed Kite Pharma to begin filing a rolling BLA on December 4th, 2016, and grants an accelerated review process from the FDA. This priority review status may give KTE-C19 an advantage in the race to be the first engineered T-cell therapy to market. Additionally, orphan drug status may grant Kite Pharma financial subsidization for clinical research, tax incentives, and extended patent protection if KTE-C19 is approved.



Acquisitions, Collaborations, and Partnerships

Kite Pharma has strategically positioned themselves to ensure that they will be capable of manufacturing their products upon FDA approval. The company has secured two locations for clinical manufacturing: one in Santa Monica, CA and one in El Segundo, CA.¹ Both of these facilities have been furnished with state of the art equipment and will serve as the base of operations for clinical manufacturing. The El Segundo facility opened in June 2016 and it is scheduled to be operational for commercialization of KTE-C19 prior to its expected FDA approval in 2017.² Additionally, Kite Pharma has collaborated with General Electric to develop an integrated and automated device for streamlining their T-cell therapy manufacturing method to ensure it is effective, consistent, and safe. Kite Pharma has also recently announced a deal with Vitruvian Networks to develop an integrated platform for patients, physicians, and treatment centers to help coordinate the logistics for treatment with their therapies, allowing a seamless form of communication between all relevant parties during a patient's treatment.

In an effort to support their research and development (R&D) efforts, Kite Pharma entered a stock purchase agreement to acquire all outstanding shares of the T-Cell Factory (TCF), renamed Kite Pharma EU B.V., on March 17, 2015 for \$21 million, making TCF a wholly owned subsidiary.³ TCF has developed a novel platform for discovering unique tumor antigens for T-cell receptor (TCR) therapies and Kite Pharma plans to use this technology to expand their pipeline of TCR products. The company has made numerous additional collaborations and partnerships to support their R&D efforts, including multiple cooperative research and development agreements with the National Cancer Institute, collaborations with major pharmaceutical companies Amgen and Genentech, and a partnership with Cell Design Labs to improve the design and safety of their CAR T-cell products. A full list of their collaborations and partnerships is detailed in Appendix A. What is clear from this analysis is that Kite Pharma has taken multiple steps to ensure commercial success at scale and is not attempting to simply bring a drug to approval for a larger company to buy them out. This foresight by management emphasizes their confidence in the product pipeline.

¹ Kite Pharma, Inc. (February 19th, 2015). *Kite Pharma Establishes Manufacturing Capabilities to Support Development and Commercialization of CAR and TCR Cancer Immunotherapy Products*. [Press Release]. Retrieved from: <http://ir.kitepharma.com/releasedetail.cfm?releaseid=897155>

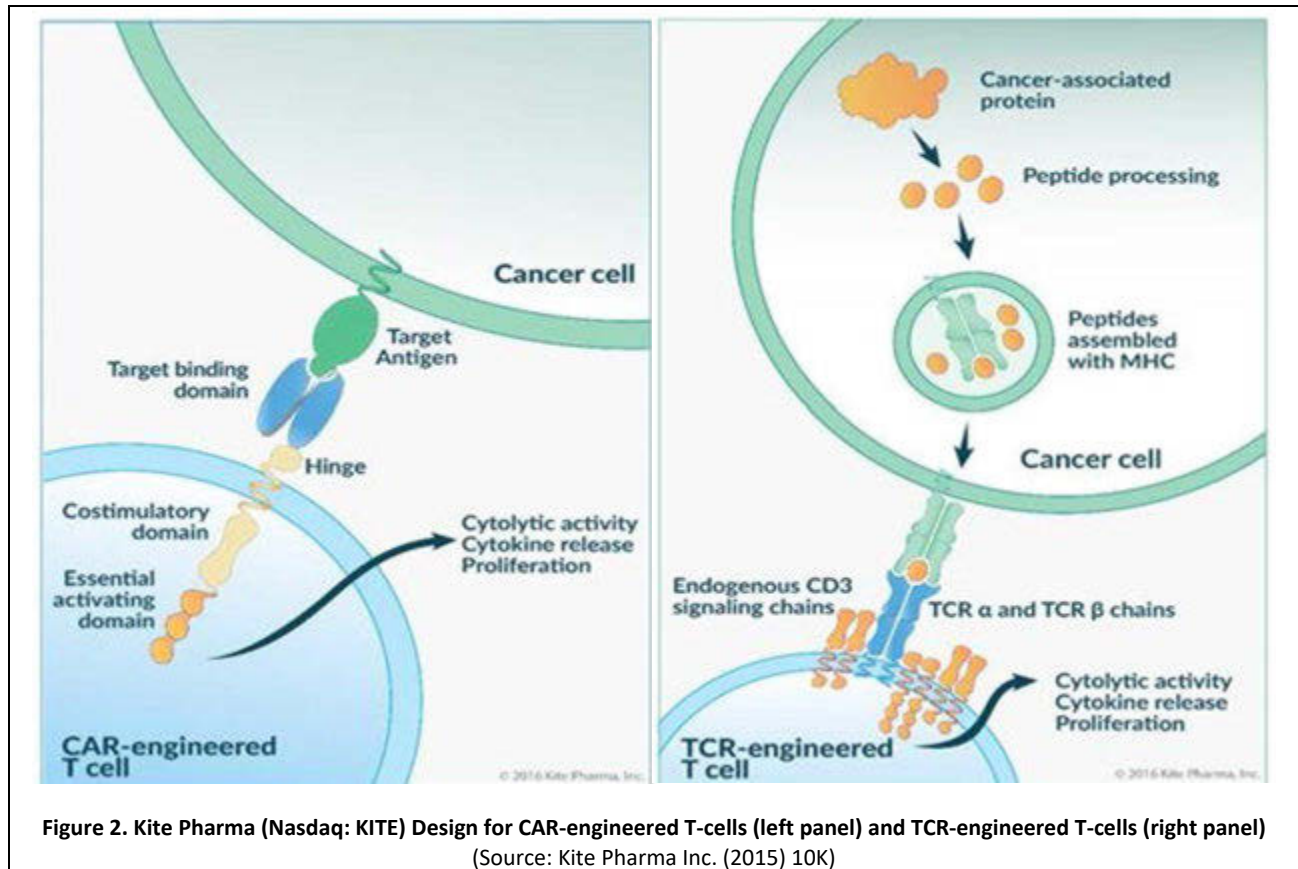
² Kite Pharma, Inc. (June 20th, 2016). *Kite Pharma Opens State-of-the-Art T-Cell Therapy Manufacturing Facility*. [Press Release]. Retrieved from: <http://ir.kitepharma.com/releasedetail.cfm?releaseid=976420>

³ Kite Pharma paid approximately \$15.1 million in cash and issued \$4.2 million in shares of common stock (66,120 share). Approximately €2 million was withheld from sellers to satisfy potential indemnity claims, and will be repaid at the close of the 18 month indemnity hold back period.

Business Model:

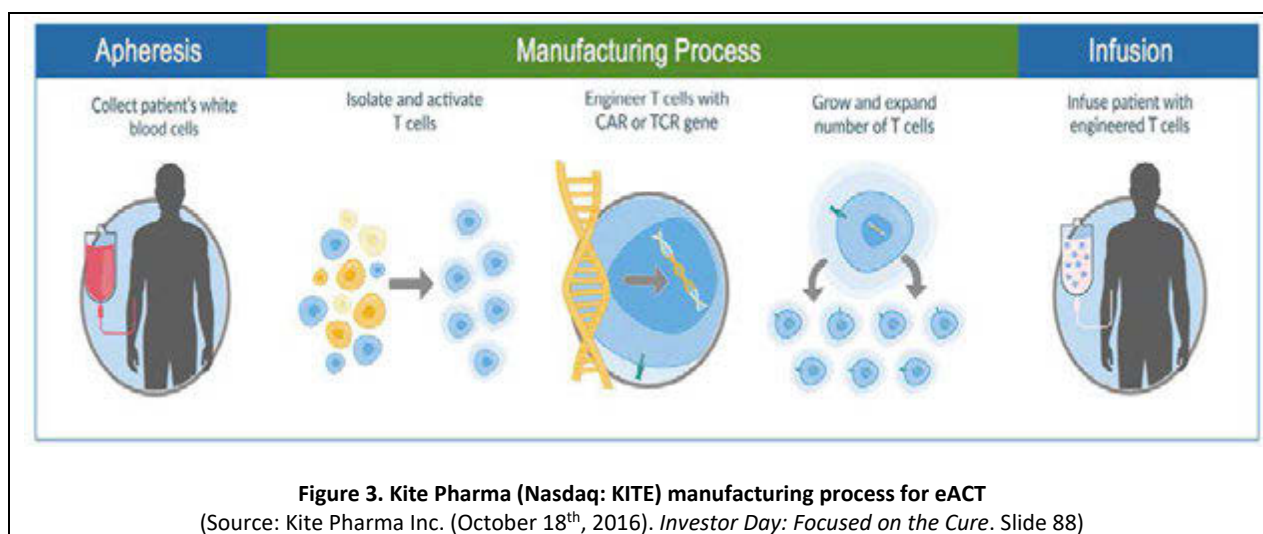
eACT Design and Manufacturing:

Kite Pharma has developed two types of engineered autologous cell therapies (eACT): Chimeric Antigen Receptors (CAR) and T-Cell Receptors (TCR). Both therapies involve engineering a patient's own T-cells to target their tumor, and each method has advantages and disadvantages. CARs are capable of recognizing antigens on the surface of cancer cells and do not rely on MHC (major histocompatibility complex) presentation (Figure 2). Therefore, they do not require the therapy to be matched to the patient's HLA (human leukocyte antigen) type making them universal. TCRs require an antigen to be presented by MHC, but are capable of recognizing internal antigens and allow for the scope of potential targets to widen (Figure 2). Additionally, TCRs are capable of recognizing antigens presented by other immune cells, which can further stimulate the immune system and increase the immune response against tumor cells.



Manufacturing T-cell therapies is complicated and requires a patient's blood sample to be shipped to a separate facility for processing (Figure 3). The patient's T-cells are isolated, activated, and infused with either a CAR or TCR gene. The engineered T-cells are then expanded and shipped back to the patient for treatment. Altogether,

Kite Pharma states this process takes up to two weeks and the company has reported a 97% success rate thus far.⁴ In June 2016, Kite Pharma opened their state of the art facility for commercial manufacturing in El Segundo, CA. The company estimates that the facility could process up to 5,000 patient samples per year.⁵



B-cell Malignancies:

Kite Pharma's lead product (KTE-C19) is a CAR T-cell therapy that targets the cell surface antigen CD-19, which is found on B-cell lymphomas and leukemias. The patients currently being tested in clinical trials have all failed treatment with at least one therapy prior to enrollment. The standard treatment for patients diagnosed with DLBCL, the most common form of NHL, is a chemotherapy regiment called R-CHOP.⁶ If complete remission is achieved after treatment, patients may be eligible to undergo a potentially curative stem cell transplant. However, some patients never reach complete remission and do not qualify for a stem cell transplant. Other patients have recurrences of disease despite initially responding to treatment even after receiving a stem cell transplant in some cases. Some of these patients eventually become refractive to all available therapies and are considered to have relapsed and refractory disease with no further efficacious treatment options. CAR T-cell therapy offers these patients another chance for remission, and possibly another opportunity for a curative stem cell transplant.

In addition to DLBCL, KTE-C19 is being tested in other forms of relapsed/refractory NHL. These include Primary Mediastinal B-Cell Lymphoma (PMBCL), Transformed Follicular Lymphoma (TFL), Mantle Cell Lymphoma (MCL), and acute Lymphoblastic Leukemia (ALL). Kite Pharma is also testing CAR and TCR T-cell therapies

⁴ Kite Pharma Inc. (October 18th, 2016). *Investor Day: Focused on the Cure*. Slide 88

⁵ Kite Pharma Inc. (June 20th, 2016). *Kite Pharma Opens State-of-the-Art T-Cell Therapy Manufacturing Facility*. [Press Release]. Retrieved from: <http://ir.kitepharma.com/releasedetail.cfm?ReleaseID=976420>

⁶ Roschewski, M. *et al.* Diffuse large B-cell lymphoma- treatment approaches in the molecular era. *Nat Rev Clin Onc.* **11**, 12-23 (2014).

that target different antigens specific for other forms of blood cancers and solid tumors (Figure 1).

Clinical Trial Results:

KTE-C19 for Chemorefractory DLBCL, PMBCL, TFL (ZUMA-1)

KTE-C19 is currently being tested in a Phase 2/3 trial in patients with aggressive forms of relapsed/refractory NHL, including DLBCL, PMBCL and TFL. In September 2016, Kite Pharma released interim results for its ZUMA-1 clinical trial and presented data at the annual American Society for Hematology (ASH) meeting in December 2016 (Figure 4).⁷ KTE-C19 achieved an objective response rate⁸ (ORR) of 76% and a complete response⁹ (CR) of 47% in DLBCL. By month 3, those rates drop to 39% for ORR and 33% for CR. In PMBCL and TFL, the results were even more striking, with 64% of patients achieving and ORR and CR at 3 months post treatment. The data for 6 and 9 months post treatment are expected by March of 2017. Based on these promising results, Kite Pharma began a rolling submission of a BLA to the FDA for KTE-C19 in relapsed/refractory NHL on December 4th, 2016.¹⁰ Management expects the BLA to be submitted in full by the end of the first quarter in 2017.

	ZUMA-1 Phase 1		ZUMA-1 Phase 2					
	DLBCL (n=7)		DLBCL (n=51)		TFL/PMBCL (n=11)		Combined (n=62)	
	ORR (%)	CR (%)	ORR (%)	CR (%)	ORR (%)	CR (%)	ORR (%)	CR (%)
ORR	71	57	76	47	91	73	79	52
Month 3	43	43	39	33	64	64	44	39
Months 6 and 9	43	43	Data Pending					

Figure 4. Interim results from KTE-C19 ZUMA-1 Clinical Trial
 (Source: Kite Pharma Inc. (September 26th, 2016). *Kite Pharma Announces Positive Topline KTE-C19 Data from ZUMA-1 Pivotal Trial in Patients with Aggressive Non-Hodgkin Lymphoma (NHL)*. [Press Release])

⁷ Kite Pharma Inc. (September 26th, 2016). *Kite Pharma Announces Positive Topline KTE-C19 Data from ZUMA-1 Pivotal Trial in Patients with Aggressive Non-Hodgkin Lymphoma (NHL)*. [Press Release]. Retrieved from: <http://ir.kitepharma.com/releasedetail.cfm?ReleaseID=990947>

⁸ The overall response rate (ORR) is the proportion of patients with a reduction in tumor size of a predefined amount over a minimum period of time. In this trial, patients were said to reach ORR if they had a reduction in tumor volume or either a partial response or a complete response at 3 months post treatment with KTE-C19. Source: <https://www.fda.gov/downloads/drugs/guidancecomplianceregulatoryinformation/guidances/ucm071590.pdf>

⁹ Complete response (CR) is defined by the absence of tumor. In this trial, patients were said to reach CR if there was no evidence of tumor cells at 3 months post treatment with KTE-C19. Source: <https://www.fda.gov/downloads/drugs/guidancecomplianceregulatoryinformation/guidances/ucm071590.pdf>

¹⁰ Kite Pharma Inc. (December 4th, 2016). *Kite Pharma Initiates Rolling Submission of U.S. Biologics License Application (BLA) for KTE-C19, its Investigational anti-CD19 CAR-T Therapy, for the Treatment of Patients with Relapsed/Refractory Aggressive B-cell Non-Hodgkin Lymphoma (NHL)*. [Press Release]. Retrieved from: <http://ir.kitepharma.com/releasedetail.cfm?ReleaseID=1002522>

KTE-C19 for Relapsed/Refractory MCL (ZUMA-2)

At this time, Kite Pharma has not released any data from patients enrolled in the Phase 2 ZUMA-2 clinical trial for Mantle Cell Lymphoma (MCL), which is currently still enrolling patients. Interim clinical trial results are expected in 2017.

KTE-C19 for Adult and Pediatric Relapsed/Refractory ALL (ZUMA-3 and ZUMA-4)

KTE-C19 is also being tested in a Phase 1/2 trial in adult and pediatric patients with relapsed/refractory ALL. The data were presented at the annual ASH meeting in December of 2016. 9/11 patients, 82%, had complete remission during preliminary analysis and 100% tested negative for minimal residual disease.¹¹ 38% of patients experienced severe cytokine release syndrome and neurological effects. Kite Pharma plans to begin the Phase 2 portion of the study in 2017.

Future Innovation:

As detailed above, Kite Pharma has seen remarkable success in patient populations that have no alternate therapies. However, a significant number of patients have exhibited serious side effects, including cytokine release syndrome (CRS) and severe neurologic effects (NE).¹² CRS occurs as a result of over-stimulating the immune system, causing systemic symptoms such as high fever, nausea, hypotension (low blood pressure), dyspnea (difficult breathing), and tachycardia (fast heart-rate). These symptoms can range from mild to life threatening. The neurological effects that have been reported include confusion, delirium, and seizures; the cause of these effects is not yet known. These side effects have been manageable by closely monitoring patients and dampening the immune response with steroids when necessary. Despite the risk of adverse effects, a majority of physicians have reported that they would still recommend CAR T-cell therapy since there are currently no other treatment options available for these patient populations.¹³

Kite Pharma reported in its ZUMA-1 trial that 29% of patients exhibited CRS and 13% exhibited NE.¹⁴ Three patients have died during the trial, but not due to these side effects. Kite Pharma has reported no cases of cerebral edema in any of their trials to date. In contrast, there have been several deaths in patients enrolled in competitor's

¹¹ Kite Pharma Inc. (December 4th, 2016). *Kite Pharma Reports 82 percent of Patients Achieved Complete Remission in Preliminary Analysis from Phase 1 ZUMA-3 and ZUMA-4 Trials of KTE-C19 in Adult and Pediatric Patients with High Burden Relapsed/Refractory Acute Lymphoblastic Leukemia*. [Press Release]. Retrieved from: <http://ir.kitepharma.com/releasedetail.cfm?ReleaseID=1002521>

¹² Bonifant, C.L. et al. Toxicity and Management in CAR T-cell Therapy. *Mol Ther Oncolytics*. **3**, 16011 (2016).

¹³ Kite Pharma Inc. (October 18th, 2016) *Investor Day: Focused on the Cure*. Slide 103.

¹⁴ Kite Pharma Inc. (September 26th, 2016). *Kite Pharma Announces Positive Topline KTE-C19 Data from ZUMA-1 Pivotal Trial in Patients with Aggressive Non-Hodgkin Lymphoma (NHL)*. [Press Release]. Retrieved from: <http://ir.kitepharma.com/releasedetail.cfm?ReleaseID=990947>

Juno Therapeutics' Phase 2 ROCKET trial as a result of cerebral edema, prompting Juno to voluntarily suspend their trial until the cause can be investigated further.¹⁵

In response to the severe side effects observed, Kite Pharma has begun developing safety measures to incorporate into their future engineered CAR T-cell therapies. One of these modifications includes a molecular control switch that would allow physicians to kill the engineered CAR T-cells if severe side effects occur.¹⁶ This process would be reversible, allowing the remaining T-cells to continue attacking the tumor after the side effects have subsided. KITE-796 is the first product developed to contain the control switch, and Kite Pharma expects to file an IND application in 2018.¹⁷

Competition:

There are several companies in addition to Kite Pharma that are involved in developing CAR and TCR engineered T-cells, including Novartis (NYSE: NVS), Juno Therapeutics (Nasdaq: JUNO), and bluebird bio (Nasdaq: BLUE).

Novartis' candidate CTL019 is the closest to reaching FDA approval. CTL019 is also a CAR engineered T-cell designed to target CD19 and has been tested in patients with relapsed/refractory adult and pediatric ALL and relapsed/refractory DLBCL; the clinical trial results have been promising and comparable to Kite Pharma's ZUMA-1 trial.¹⁸ CTL019 has been designated a breakthrough therapy by the FDA and Novartis plans to file a BLA in early 2017 for ALL with a BLA for DLBCL to follow later on in the year. Since the timeline for approval is similar to KTE-C19, and the diseases being tested are the same, Novartis poses the biggest threat to Kite Pharma's success.

Juno Therapeutics has recently suspended its Phase 2 ROCKET trial after 5 patient deaths linked to their JCAR015 CAR T-cell therapy.¹⁹ Thirty-eight people have been treated with JCAR015, making their treatment mortality rate a high 13%. It is unclear if Juno will seek to continue developing JCAR015 or if it will cease to develop the product altogether. Juno Therapeutics released positive Phase 1 data on its other leading product JCAR017 in the TRANSCEND trial, which also targets CD19 in ALL and

¹⁵ Juno Therapeutics. (November 23rd, 2016). *Juno Therapeutics Places JCAR015 Phase II ROCKET Trial on Clinical Hold*. [Press Release]. Retrieved from: <http://ir.junotherapeutics.com/phoenix.zhtml?c=253828&p=irol-newsArticle&ID=2225491>

¹⁶ Kite Pharma Inc. (June 2nd, 2016). *Kite Pharma and Cell Design Labs Announce Exclusive Research Collaboration Using Molecular 'On/Off Switches' for CAR T-cell Immunotherapies*. [Press Release]. Retrieved from: <http://ir.kitepharma.com/releasedetail.cfm?releaseid=973947>

¹⁷ Kite Pharma Inc. (October 18th, 2016) *Investor Day: Focused on the Cure*. Slide 13.

¹⁸ Novartis. (December 6th, 2015). *Novartis Announces New CTL019 Study Data Demonstrating Overall Response in Adult Patients with Certain Types of Lymphoma*. [Press Release]. Retrieved from: <https://www.novartis.com/news/media-releases/novartis-announces-new-ctl019-study-data-demonstrating-overall-response-adult>

¹⁹ Juno Therapeutics. (November 23rd, 2016). *Juno Therapeutics Places JCAR015 Phase II ROCKET Trial on Clinical Hold*. [Press Release]. Retrieved from: <http://ir.junotherapeutics.com/phoenix.zhtml?c=253828&p=irol-newsArticle&ID=2225491>

DLBCL, that were comparable to Kite Pharma's KTE-C19 results.²⁰ However, at this point, Juno Therapeutics is at least a year behind Kite Pharma in the race to FDA approval.

Bluebird bio, partnered with Celgene (Nasdaq: CELG), has several T-cell therapies in the early stages of development. The interim results from a Phase 1 trial were recently released for their leading candidate bb2121, a CAR T-cell that targets B-Cell Maturation Antigen (BCMA). Bb2121 is being tested in Multiple Myeloma (MM). 100% of the 6 patients in the second and third dose cohort reached the objective response rate, and 2 patients had no evidence of disease at 4 and 6 month follow ups.²¹ Importantly, none of the patients developed severe side effects such as cytokine release syndrome or neurological toxicities, making these early data the most compelling seen for any CAR T-cell therapy to date. Kite Pharma is currently in the pre-clinical stage of development for its candidate KTE-585, which is being developed to target BCMA in MM, and plans to file an IND application sometime during 2017.²² Currently, this puts Kite Pharma behind in the race for MM therapies in development. However, the company is much more established when it comes to manufacturing capabilities due to its progress in preparing to advance KTE-C19 to market, which may provide an edge when moving through the clinical stage of development.

Historical Performance:

Pre-profit biotechnology companies are commonly prone to volatility in market prices due to their high risk of failure. Thus, Kite Pharma has been subject to large price swings especially since they are developing a therapy that has no FDA approved equivalent. The uncertainty in commercial success for engineered T-cell therapy has contributed to frequent changes in the stock price often driven by press releases for clinical trial results or FDA announcements from either Kite Pharma or any of its competitors. In addition, there has been an overall downward trend in the biotech sector beginning in late 2015 and continuing throughout much of 2016 (Figure 5).

The healthcare industry has also recently faced considerable political headwinds in response to concerns about overpriced drugs. There have been several calls for increased regulation to prevent pharmaceutical companies from inflating their drug prices to boost revenues, especially for drugs that are life saving and necessary for a patient's health. As a result, the entire biotech sector has suffered under the uncertainty of what potential regulations may mean for future biotech revenues.

²⁰ Juno Therapeutics. (December 5th, 2016). *Juno Therapeutics Presents Data from TRANSCEND Study Showing 60% Complete Response in Patients with Relapsed or Refractory Aggressive CD19+ Non-Hodgkin Lymphoma*. [Press Release]. Retrieved from: <http://ir.junotherapeutics.com/phoenix.zhtml?c=253828&p=irol-newsArticle&ID=2227607>

²¹ Bluebird Bio. (November 30th, 2016). *bluebird bio Announces Interim Phase I Dose Escalation Data for its Anti-BCMA CAR T Product Candidate in Patients with Relapsed/Refractory Multiple Myeloma*. [Press Release]. Retrieved from: <http://investor.bluebirdbio.com/phoenix.zhtml?c=251820&p=irol-newsArticle&ID=2226688>

²² Kite Pharma Inc. (October 18th, 2016) *Investor Day: Focused on the Cure*. Slide 24.



Figure 5. Kite Pharma (Nasdaq: KITE) stock performance (white line) since they went public on June 20th, 2014
(Source: Bloomberg Terminal; Command <GP>; Accessed 12-8-16)

Compared to the S&P 500 and the S&P 600 Health Care Index, Kite Pharma has underperformed over the last year (Figure 6). However, this is not surprising or unexpected for a pre-profit biotechnology company where one data release is enough to ensure outperformance.



Figure 6. Kite Pharma (Nasdaq: KITE) stock performance (white line) compared to the S&P 500 (purple line) and the S&P SmallCap 600 Health Care Index (orange line)
(Source: Bloomberg Terminal; Command <GP>; Accessed 12-8-16)

Since Kite Pharma has not yet brought any of its T-cell therapies to market yet, they have not generated significant revenues. To date their revenues have come solely from their partnerships with other companies. As a result their earnings per share (EPS) have been negative, and are forecasted to remain negative through FY2017 (Figure 7).



Pre-Profit Biotechnology Model:

We have created a proprietary discounted net present value (NPV) model for determining the valuation of a pre-profit biotechnology company. Using this model, we can estimate the revenues expected from a drug in the event of FDA approval and weigh this outcome against a reasonable probability of failure. Our model for Kite Pharma accounts for its lead product (KTE-C19) in three potential approval settings: FDA approval for treatment of relapsed/refractory DLBCL²³, EMA approval for relapsed/refractory DLBCL, and FDA approval for adult and pediatric relapsed/refractory ALL. We chose to only include this drug candidate for these indications since Kite Pharma's other products are currently not developed enough to accurately evaluate their potential for success. However, it is worth noting that Kite Pharma has numerous promising products in their pipeline that could progress to completion within the timeline of our model (Figure 1). Therefore, we may be understating potential earnings.

In addition to our NPV model, we have simulated the probability of drug approval based on the clinical stage that the drug is currently being evaluated at. For

²³ For the purposes of our model, we are incorporating the extremely small PMBCL and TFL patient population into the larger population of DLBCL patients.

example, a drug that has successfully completed a Phase 3 clinical trial is more likely to become FDA approved than a drug that is still undergoing Phase 1 evaluation. By attributing probabilities calculated from historical drug approval rates at each stage of drug development, we can model a distribution that includes the chances of both drug success and failure and arrive at a more accurate representation of the fundamental value of the company.²⁴ Using a Monte Carlo simulation, we have considered the probability of regulatory approval in the context of the potential revenues projected by our NPV model and obtained a multimodal distribution that reflects the range of possible market share prices depending on the success of KTE-C19.²⁵ By comparing our distribution to the current stock price we can assess whether the market is discounting a realistic probability of success or not.

The core of our model was built with primary data from SEC filings from the last three fiscal years since the company's inception (FY2013-FY2015). Quarterly filings from the first three quarters of 2016 were included for projecting FY2016 data.

Income Statement and Balance Sheet Trends:

These results are contained on the "Balance Sheet" and "Income Statement" tabs of the accompanying spreadsheet

Kite Pharma recorded \$17.3 million in revenues in FY2015, and is expected to record approximately \$22.5 million in FY2016.²⁶ These revenues are generated solely from partnerships, particularly with Amgen, since Kite Pharma has not yet commercialized any of its T-cell therapies.

On the balance sheet, there is a steady decline in cash and total assets throughout the first three quarters of 2016. At the time of this writing, Kite Pharma has reported \$477.1 million in cash and investments. The company has averaged a net burn rate of \$62.3 million per quarter in 2016. Assuming they maintain this level of spending until the first FDA approval and launch of KTE-C19, Kite Pharma currently has a runway of approximately 7 quarters, or 21 months. This is in line with management's estimate that current cash holdings will be sufficient to carry the company until mid-way through 2018. If the FDA approval and/or launch of KTE-C19 are delayed for any reason, Kite Pharma could be forced to take on debt to support operations. Currently, the company is debt free.

There is a notable increase in long-term assets in FY2015 that reflects the stock purchase agreement of T-Cell Factory (TCF), renamed Kite Pharma EU B.V., and the construction of El Segundo, the state-of-the-art commercial T-cell therapy manufacturing facility. It is worth noting that Kite Pharma is required to pay up to €242.5 million to TCF upon achieving certain clinical, regulatory, and sales goals. These payments were not factored into our model since they only apply to TCR products, which are still in the earlier stages of development. However, these payments may

²⁴ Keegan, K. *Biotechnology Valuation: An Introductory Guide*. England: John Wiley and Sons 2008; pg. 40

²⁵ Program: Crystal Ball by Oracle

²⁶ Consensus from the Bloomberg Terminal as of December 8th, 2016

come into play in the later years of our model and may cause erosion to Kite Pharma's revenues.

Modeling FDA Regulatory Approval:

These results are contained on the "Alpha-Beta Values" and "Revenue Growth Projections" tabs of the accompanying spreadsheet

In order for a new drug to be brought to market, it must pass through four stages: discovery and development, pre-clinical research, clinical research, and FDA review.²⁷ If a drug becomes FDA approved, it moves into stage five where the drug continues to be monitored for safety. The probability that a drug will reach the market can be assessed once it reaches the clinical research stage (Table 1). As a drug successfully progresses from one phase of clinical trials to the next, the expected probability that it will become FDA approved increases.

Expected Probability of Success Throughout the FDA Approval Process	
Phase 1	15%
Phase 2	25%
Phase 3	60%
Application Review Process	90%

Table 1. The Probability that the FDA will Approve a Drug is Dependent Upon its Stage in Clinical Research
(Source: Keegan, K. *Biotechnology Valuation: An Introductory Guide*. England: John Wiley and Sons 2008; pg. 40)

Using these probabilities, we can model the likelihood that the FDA will approve a new drug using a continuous probability distribution, specifically a beta distribution.²⁸ Beta distributions are defined by the interval [0,1], and are influenced by the shape parameters denoted α and β . Here, we used the probability density function with a beta distribution to solve for α and β :

$$p(x) = \begin{cases} \frac{x^{\alpha-1}(1-x)^{\beta-1}}{B(\alpha, \beta)} & \text{for } 0 < x < 1 \\ 0, & \text{for } x \text{ otherwise} \end{cases}$$

$$B(\alpha, \beta) \text{ is the beta function defined as: } B(\alpha, \beta) = \int_0^1 t^{\alpha-1}(1-t)^{\beta-1} dt$$

Solving for the expected value (mean) and variance of this distribution gives us:

²⁷ U.S. Food and Drug Administration. (June 24th, 2015). *The Drug Development Process*. Retrieved from: <http://www.fda.gov/forpatients/approvals/drugs/default.htm>

²⁸ Wackerly, D. D., Mendenhall, W., and Scheaffer, R. L. *Mathematical Statistics with Applications*. 6th Edition (2001). Duxbury Press.

$$E(X) = \mu = \frac{\alpha}{\alpha + \beta}$$

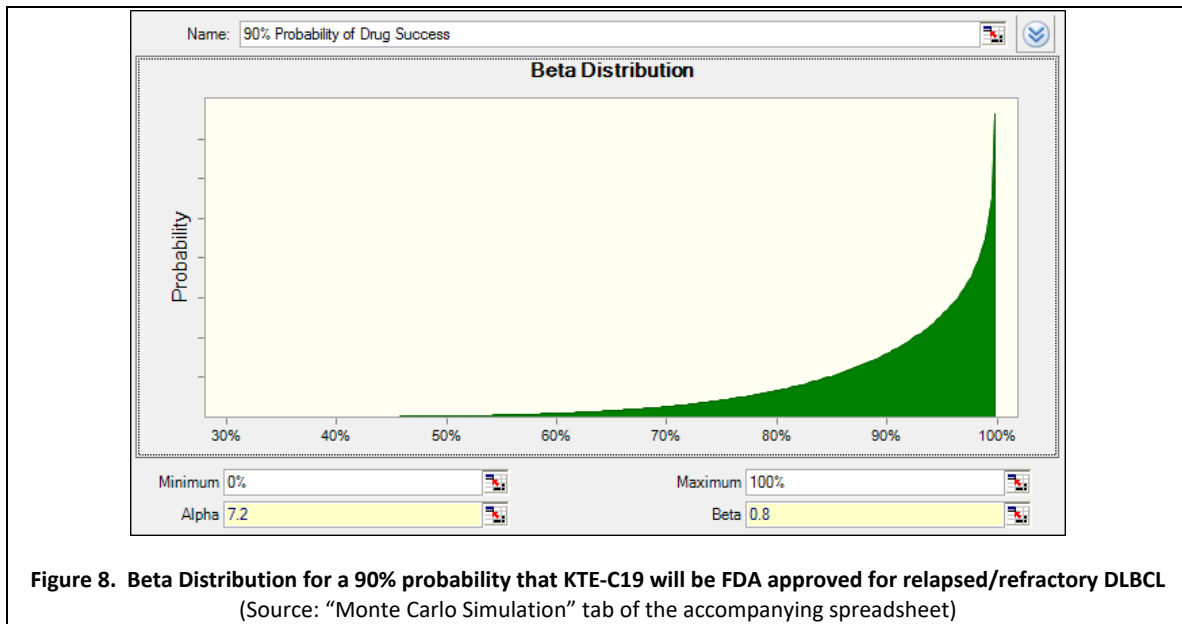
$$Var(X) = \sigma^2 = \frac{\alpha\beta}{(\alpha + \beta)^2(\alpha + \beta + 1)}$$

Since a rolling BLA for KTE-C19 has been submitted to the FDA to treat relapsed/refractory DLBCL, we can define the expected (average) probability of success of KTE-C19 becoming FDA approved for relapsed/refractory DLBCL to be 90% (the mean of this distribution). Using this probability, we can solve for α and β as follows:

$$\alpha = \left(\frac{1 - \mu}{\sigma^2} - \frac{1}{\mu} \right) \mu^2 = 7.2$$

$$\beta = \alpha \left(\frac{1}{\mu} - 1 \right) = 0.8$$

These values for α and β generate the beta distribution shown in Figure 8. Although this probability distribution appears optimistic, we are firm believers in the science and preliminary data behind Kite Pharma's KTE-C19.



Our model also takes into account the potential for KTE-C19 to be approved by the EMA for relapsed/refractory DLBCL, as well as another FDA approval for the use in adult and pediatric relapsed/refractory ALL. For these, we can assign the probability for EMA approval for DLBCL at 60% based on the Phase 2/3 status of the ZUMA-1 clinical trial, and a probability of 25% for FDA approval for ALL based on Phase 1 status for the ZUMA-3 and ZUMA-4 clinical trials. The α and β values used and graphs of each beta distribution are included in Appendix B.

Next, it is necessary to assign a uniform distribution that will generate a random variable between 0 and 1 and a separate binary cell that is capable of only taking the

values of 1 (drug success) or 0 (drug failure). This will change the NPV of our model depending on whether the drug succeeds or fails by multiplying the two values depending on the probabilities defined from our beta distributions. Using this method in a Monte Carlo simulation, we can create a distribution for the estimated stock price depending upon the success or failure of the drug for each of the indications.

For Kite Pharma, we are considering the approval of KTE-C19 for three indications. Therefore, we have incorporated three separate beta distributions into our model.

Revenue Growth Projections:

These results are contained on the "Historical Population Growth" and "Revenue Growth Projections" tabs of the accompanying spreadsheet

In order to estimate the potential revenue generated from KTE-C19 sales, it is necessary to determine the size of the target population and the potential market share of that population we expect KTE-C19 to achieve each year for each of its indications. We do this using a top-down, or waterfall, approach detailed below:

- 1. Modeling the U.S./E.U.-5 Population:** First, it is necessary to model the total population growth for both the U.S. and the E.U.-5 (United Kingdom, France, Spain, Germany, Italy) for the next 10 years. To do this, we used census data and calculated the year-over-year historical population growth for paired consecutive years. Taking the average of these, we can define the historical population growth rates to be 0.79%²⁹ for the U.S. and 0.37%³⁰ for the E.U.-5. We use these historical growth rates to project the total population for the next 10 years in our model.
- 2. Modeling the Population with Relapsed/Refractory DLBCL or ALL:** The next step is to determine the total population that exhibits the disease being treated. For DLBCL in the U.S., we first calculated the population that has been diagnosed with NHL, which is 0.022% of the total U.S. population.³¹ Of those with NHL, approximately 35% of patients are diagnosed with DLBCL.³² From these patients, approximately 40% will develop relapsed/refractory disease.³³ For DLBCL in the

²⁹ Data for the U.S. population was obtained from the census bureau. Data retrieved from: <http://www.multpl.com/united-states-population/table>

³⁰ Data for the E.U.-5 population was obtained from data provided by Statista. The yearly populations from each country in the E.U.-5 were summed and the average growth rate was obtained. The data were retrieved from: <https://www.statista.com/statistics/611363/population-of-europe-by-country/>

³¹ In 2016, the NIH SEER program estimated 72,580 new cases diagnosed of DLBCL. This is approximately 0.022% of the US population, and this value was therefore used as the rate of new diagnoses for our model. The data were retrieved from: <https://seer.cancer.gov/statfacts/html/nhl.html>

³² Consensuses vary, but most sources agree the rate of DLBCL is between 30-40% of all NHL cases. We chose to take the average of this range, 35%, for our model. Representative Source: Roschewski, M. *et al.* Diffuse large B-cell lymphoma- treatment approaches in the molecular era. *Nat Rev Clin Onc.* **11**, 12-23 (2014).

³³ Similar to above, consensuses vary. We choose to use a rate of 40% for our model. Representative Source: Freidber, J. W. Relapsed/Refractory Diffuse Large B-Cell Lymphoma. *Hematology Am. Soc. Hematol. Educ. Program.* **2011**, 498-505 (2011).

E.U.-5, approximately 0.007% of the population is diagnosed with DLBCL³⁴, and 40% of this population will develop relapsed/refractory disease.³⁵ For ALL in the U.S., approximately 0.002% of the population is diagnosed with ALL³⁶, and 20% of this population will develop relapsed/refractory disease.³⁷

- 3. Determining the Market Share the Drug is Expected to Obtain:** Once the target population has been determined, the next step is to assign the percentage of that market that the drug is expected to achieve. For KTE-C19, we expect a relatively low market penetration due to manufacturing constrictions and severe side effects, especially right after regulatory approval. In the initial year of launch, we have conservatively estimated that the market penetration will be 0.1% for DLBCL and 0.5% for ALL. From here, we expect the market penetration to increase by 2% each year. We chose to conservatively project KTE-C19's market penetration because the immunotherapy field is becoming increasingly crowded, and competition from companies developing monoclonal antibodies and similar CD19 CAR T-cell therapies will erode revenues as additional drugs become approved for the same populations. Therefore, it is possible that our conservative approach has undervalued the revenue growth for Kite Pharma. To balance our moderate projections, however, we set a uniform distribution for market penetration to increase by 2-4% in our Monte Carlo simulation.
- 4. Estimating the Cost of the Drug:** Lastly, we must estimate the cost of the drug. Since there are no similar therapies on the market, we chose to use the costs of stem cell transplants for comparison. Autologous stem cell transplants can cost anywhere between \$200-\$500k and allogeneic stem cell transplants can cost upwards of \$900k.³⁸ Based on these values, we chose to set our price at \$400k per treatment, with a uniform distribution ranging from \$300-\$550k in our Monte Carlo simulation.

By multiplying the target population by the expected market penetration rate and the cost of the drug, we can estimate the potential revenue generated for that year. Summing the revenues for each of the indications gives the total estimated revenue for the company per year based on the sales of KTE-C19.

Lastly, it is important to consider the timeline for FDA approval in each of the indications (Table 2). In the best-case scenario, KTE-C19 could become FDA approved in

³⁴ In their 2016 Investor Day presentation, Kite Pharma cited data indicating 22,000 new cases of DLBCL diagnosed in the E.U.-5 in 2016. This is approximately 0.007% of the total E.U.-5 population calculated above, and this value was therefore used for our model. Source: Kite Pharma Inc. (October 18th, 2016) *Investor Day: Focused on the Cure*. Slide 100.

³⁵ Tilly, H. et al. Diffuse large B-cell lymphoma (DLBCL): ESMO Clinical Practice Guidelines for diagnosis, treatment and follow-up. *Ann. Oncol.* **26** (Supplement 5), v116-v125 (2015).

³⁶ In 2016, the NIH SEER program estimated 6,590 new cases diagnosed of ALL. This is approximately 0.002% of the U.S. population, and this value was therefore used as the rate of new diagnoses for our model. The data were retrieved from: <https://seer.cancer.gov/statfacts/html/aly1.html>

³⁷ Raetz, E. A. and Bhatla, T. Where do we stand in the treatment of relapsed acute lymphoblastic leukemia? *Hematology Am. Soc. Hematol. Educ. Program.* **2012**, 129-136 (2012).

³⁸ Kite Pharma Inc. (October 18th, 2016) *Investor Day: Focused on the Cure*. Slide 114.

the quarter four of 2017. If the BLA is delayed, it could delay the launch date to sometime in 2018.

	FDA: DLBCL	EMA: DLBCL	FDA: ALL
2016	Phase 2/3 Rolling BLA	Phase 2/3	Phase 1
2017	BLA Completion Late 2017 Launch	BLA Submission	Phase 2/3
2018		Launch	BLA
2019			Launch

Table 2. Timeline for Expected Launch of KTE-C19 for Each of the Projected Indications
(Source: "Revenue Growth Projections" and "Pipeline" tabs of the accompanying spreadsheet)

Expense Projections:

These results are contained on the "Revenue Growth Projections" tab of the accompanying spreadsheet

In order to project expenses over the next 10 years, we looked at each expense individually and calculated the year-over-year growth for the available three years of historical data. However, these values varied widely, making it difficult to accurately project these costs. Using the three quarterly reports for 2016, we were able to project the expected growth rate for R&D and General & Administrative Costs for FY2016 to be 140% and 50%, respectively. Since Kite Pharma is currently operating numerous clinical trials while simultaneously developing additional pre-clinical products in their pipeline, we expect their R&D costs to continue to climb, and assigned 100% growth rates for 2017E and 2018E. From 2019E on, we dropped this rate to 50%.

Since we expect that KTE-C19 will be FDA approved and launched in late 2017, it is necessary to separate Selling Costs out from General & Administrative Costs. We therefore assigned a growth rate of 15% for General & Administrative Costs and a 25% for Selling Costs for all projected 10 years. By summing these values, we arrive at a reasonable growth margin of 25-26% for all projected years for total Selling, General & Administrative Costs. Lastly, we assigned a 25% growth rate for Costs of Goods Sold.

The expenses for the next 10 fiscal years were projected using these growth rates. We next calculated the Operating Income by subtracting these expenses from the total projected revenue and assigned the estimated tax rate to be 25%. Since Kite Pharma is not expected to pay royalties on KTE-C19 sales, we set this parameter to 0%.³⁹ From here, we calculated the expected net income for each year using the equation below.

$$\text{Net Income} = \text{Operating Income} - ((\text{Operating Income} * \text{Tax Rate}) + (\text{Royalties} * \text{Revenue}))$$

³⁹ Kite Pharma is not obligated to pay royalties on KTE-C19, but the company has made partnerships for some of its other products that require royalty payments, particularly its MAGE A3/A6 and HPV E6/E7 TCR products. These products were not included in our model due to lack of clinical data, and are therefore excluded when calculating Kite Pharma's projected net income.

Net Present Value (NPV) Model:

These results are contained on the "Revenue Growth Projections" tab of the accompanying spreadsheet

In order to estimate the target share price, we used the Net Present Value (NPV) equation with a discount rate of 10%.⁴⁰

$$NPV = \frac{Net\ Income_t}{(1 + Discount\ Rate)^t}$$

where t = the number of years passed

For year 10, we used the NPV Terminal Value equation with a discount rate of 10% and a residual growth rate of 1.5%.

$$NPV\ for\ 2026 = \frac{Net\ Income_{2026}}{(Discount\ Rate - Residual\ Growth\ Rate) * (1 + Discount\ Rate)^9}$$

By summing the NPV for all projected 10 years and dividing by the shares outstanding, we determined the target NPV/share for Kite Pharma to be \$85.30.

$$NPV\ per\ Share = \frac{Sum\ (NPV_t)}{Shares\ Outstanding}$$

Model Results:

These results are contained on the "Monte Carlo Simulation" and "Monte Carlo Figures" tabs of the accompanying spreadsheet

In our model for Kite Pharma we have made assumptions for the timeline for drug approval (and therefore revenue generation), drug pricing, market penetration, and expenses. Assuming regulatory approval for KTE-C19 in all three of the indications considered, we have identified a target price of \$85.30 with an 89.25% potential upside over the current stock price of \$45.07 for Kite Pharma.⁴¹

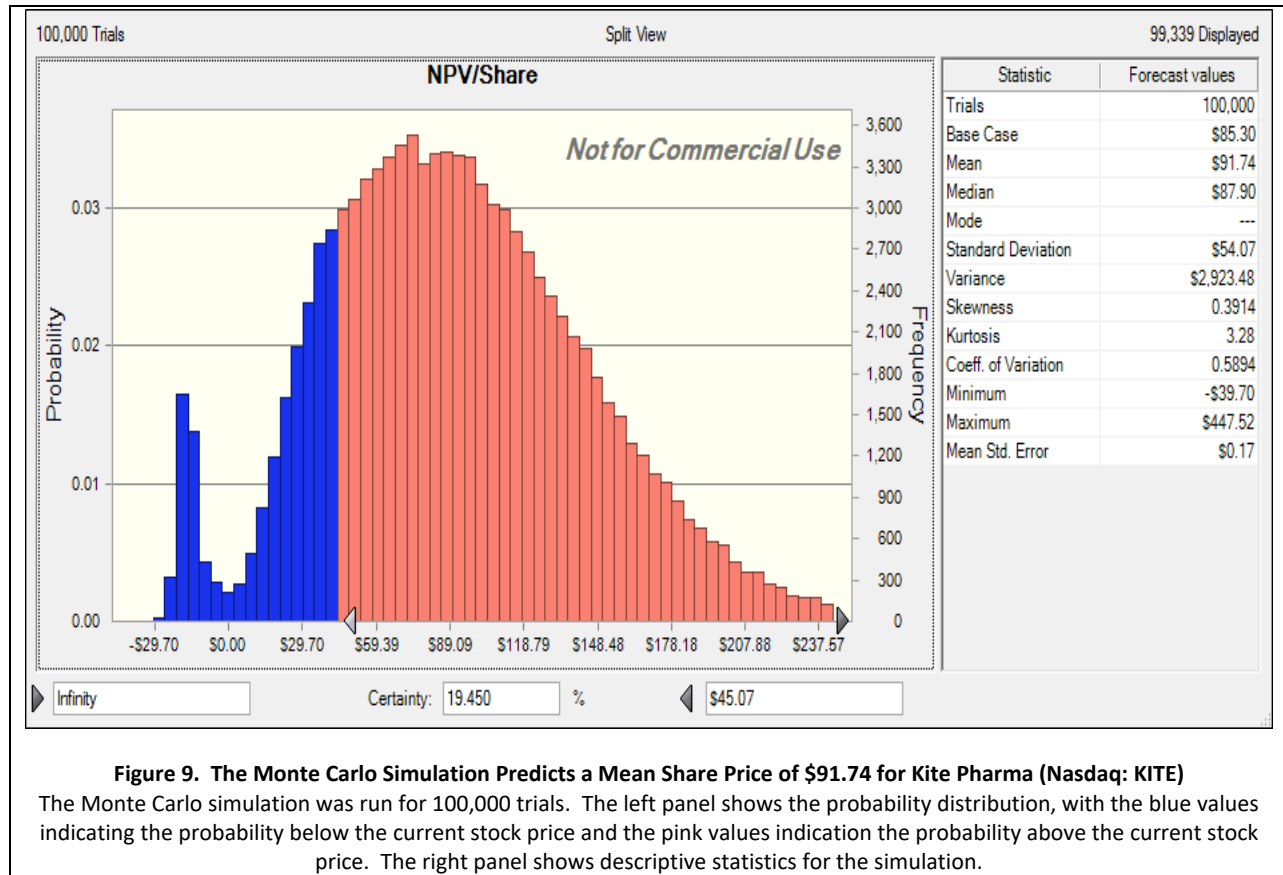
Since regulatory approval is not guaranteed, we performed a Monte Carlo simulation to account for the possibilities of both drug success and failure. The simulation takes into account the probability for drug approval based on the clinical stage of development, as well as uncertainties in the achievable market penetration rate and drug pricing. The distribution generated from this simulation was multimodal, with a mean price of \$91.74 and an upside of 103.55% (Figure 9).⁴² The current stock price of \$45.07 is in the 19th percentile, indicating that Kite Pharma is extremely undervalued and that the market is assigning a high probability of failure. This should come as no surprise given the nascent nature of the therapy, however, we firmly believe that the

⁴⁰ A discount rate of 10% was chosen over Kite Pharma's WACC of 10.8% since our model is designed to reflect the investor's opportunity cost, rather than the company's (since WACC is constantly changing, it inherently reflects only the company's opportunity cost). By contrast, 10% reflects the average rate of return from the S&P 500, and is therefore more reflective of the investor's opportunity cost.

⁴¹ At the time of this writing: December 8th, 2016.

⁴² At the time of this writing: December 8th, 2016.

pipeline is undervalued based on our analyses. Indeed, the target price of \$85.30 generated by our proprietary NPV model is in the 48th percentile of the simulation, indicating it is much closer to the fair value of the company.



The wide distribution in share prices ranging from -\$39.70 to \$447.52 in the Monte Carlo simulation is a result of a number of ambiguities expected for a pre-profit biotechnology company. In order to differentiate which factors are due to the sensitivity of the model and which are based on uncertainties in our assumptions, we performed a sensitivity analysis (Figure 10).

Some of the most influential factors found in the sensitivity analysis are expected, including the yearly growth in market penetration and the random number generator that simulated whether KTE-C19 was FDA approved or not. However, there were three factors that contributed greatly to the shape of the distribution that result from uncertainties in our assumptions within the last year in our model: the percentage of newly diagnosed NHL patients in the US (cell M27), the growth rate for Selling Costs (cell M88), and the growth rate of Cost for Goods Sold (cell M94). When these values are excluded, the results of the simulation change only minimally (mean of \$91.96), but the range of the distribution tightens slightly to -\$28.44 to \$253.90 (Figure 11). The high degree of uncertainty that remains in the distribution is not surprising for a pre-profit biotechnology company.

Overall, our NPV model and Monte Carlo simulation predict a target price that is significantly higher than what is being reflected currently in the market. The most likely reason for this discrepancy is the under appreciation of the potential for engineered T-cell therapies to drive revenues and the uncertainty of whether they will gain FDA approval. We disagree with this outlook and believe Kite Pharma has an excellent chance of commercializing its lead product KTE-C19. The company has presented compelling data indicating efficacy in clinical trials, is the first to submit a BLA to the FDA, and has the advantage of pricing power with a novel therapy targeting a small population with a current unmet need for treatments.

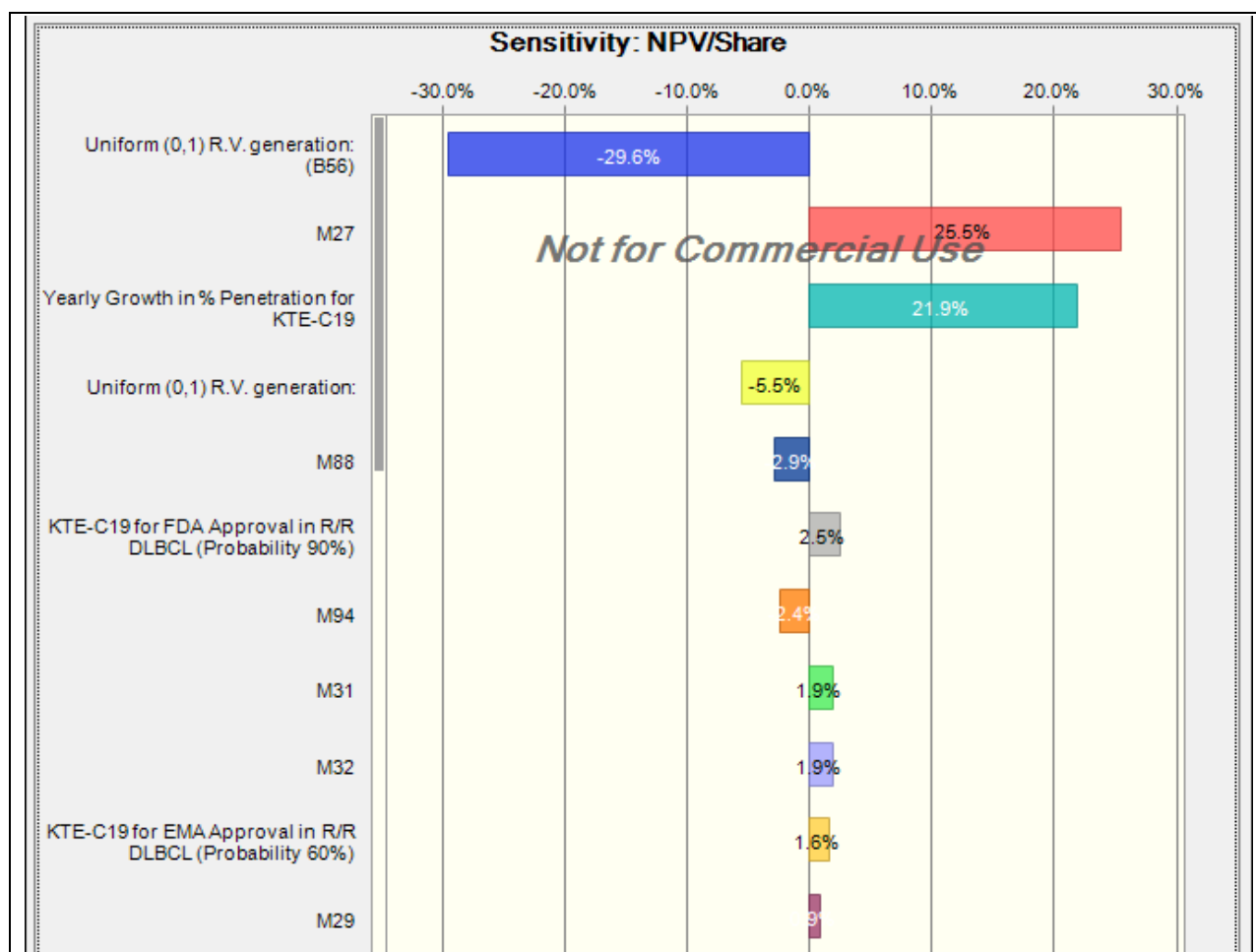


Figure 10. Sensitivity Analysis Applied to the Monte Carlo Simulation in Figure 9

Of the top influencers, newly diagnosed NHL patients in year 10 (M27), the growth rate for Selling Costs in year 10 (M88), and the growth rate for Cost of Goods Sold in year 10 (M94) were excluded due to relevance. The random number generator for the probability of FDA approval (B56 and B38), the beta distributions for KTE-C19 approval in R/R DLBCL for the FDA (B37) and the EMA (B55), and the yearly growth for market penetration (B18) are metrics that we would expect to drive the distribution of the simulation, and were therefore left intact. Additionally, we also elected to leave the percentage of refractory DLBCL patients in year 10 (M31), the cost of KTE-C19 in year 10 (M32) and the percent of patients with NHL that are diagnosed with DLBCL in year 10 (M29) intact since the correlation was below 2%.

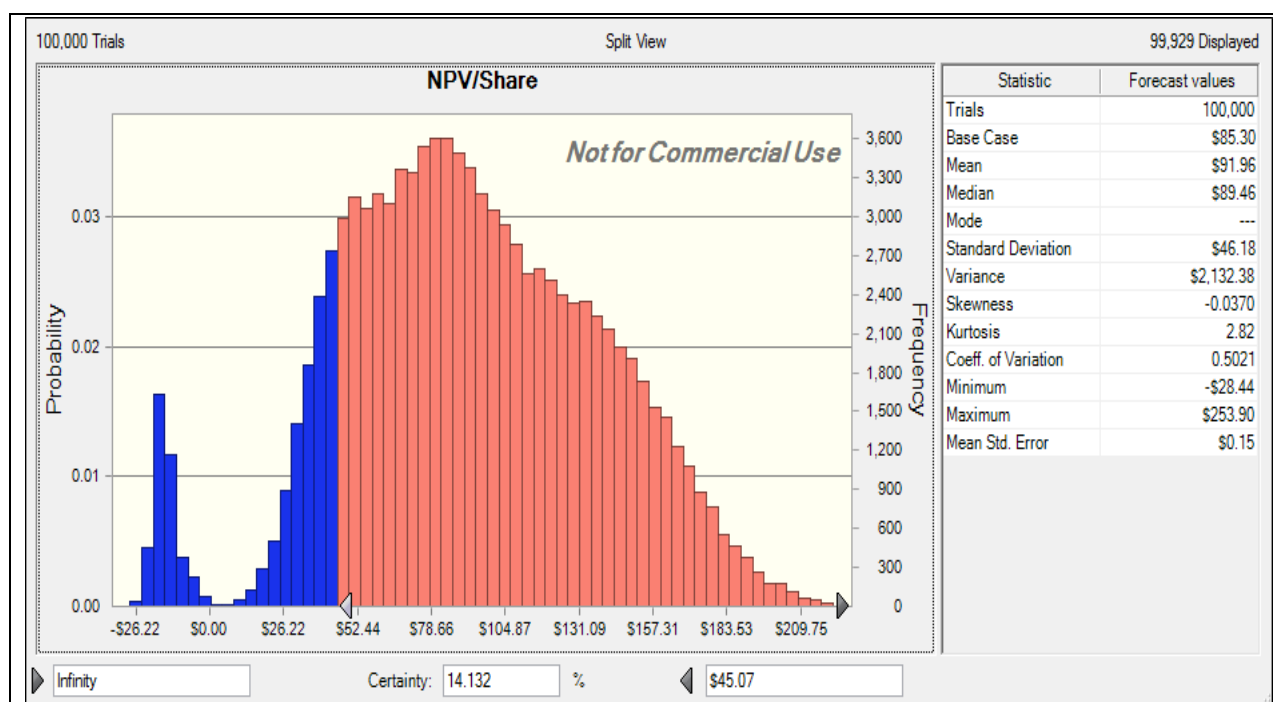


Figure 11. Sensitivity Analysis Adjusted Monte Carlo Simulation Predicts a Mean Share Price of \$91.91 for Kite Pharma (Nasdaq: KITE)

Newly diagnosed NHL patients in year 10 (M27), the growth rate for Selling Costs in year 10 (M88), and the growth rate for Cost of Goods Sold in year 10 (M94) were excluded from the simulation due to relevance. The simulation was run for 100,000 trials. The left panel shows the probability distribution, with the blue values indicating the probability below the current stock price and the pink values indicating the probability above the current stock price. The right panel shows descriptive statistics for the simulation.

Proxy Report:

To assess management's incentives and whether it is aligned with our investment thesis, we performed an analysis of the proxy statement and critically assessed management's experience with respect to bringing a novel therapy to market.

Management Experience:

Dr. Arie Belldegrun, M.D. founded Kite Pharma in 2009 and serves as its Chairman, President, and CEO. Dr. Belldegrun pioneered some of the early T-cell therapy work while completing his fellowship at the National Cancer Institute under the mentorship of Dr. Steven Rosenberg. In 1996 he founded Agensys and served as its Chairman of the Board of Directors from 1996-2002 and then as its Director until Astellas Pharma acquired the company in 2007. Dr. Belldegrun also served as the founding Vice Chairman of Cougar Biotechnology from 2003 until 2009 when Johnson & Johnson acquired it. Since then, Dr. Belldegrun has focused his expertise on developing a robust pipeline for Kite Pharma and ensuring the company is prepared for commercializing its leading product KTE-C19. Based on his prior experience and current

efforts within Kite Pharma, we believe the Dr. Belldegrün has the capacity to move the company forward in a manner that will increase shareholder value.

Since going public in 2014, Kite Pharma has worked to expand its management team. The current management officers and their experience in top pharmaceutical and biotechnology companies are detailed in Figure 12. Collectively, they boast experience from within top pharmaceutical companies and successful biotech companies. As a whole, the management team looks capable of directing Kite Pharma to commercial success.



Executive Compensation:

Kite Pharma's executive compensation plan is composed of three main parts:

1. Annual Base Salary
2. Annual Bonus Opportunity
3. Long-Term Incentive Compensation

Annual Base Salary:

The base salaries for the named executive officers are listed in Figure 13. These salaries are awarded on the basis of the executive officer's ability to lead and organize others, recognize new business opportunities, and to help Kite Pharma grow and succeed. The annual base salaries are compared to the benchmark companies listed in Table 3 to ensure that they are competitive.

NAME	2015 BASE SALARY (\$)
Arie Belidegrun	500,000
Cynthia M. Butitta	375,000
David Chang	375,000
Helen S. Kim	350,000
Jeffrey Wiczorek(1)	328,750

Figure 13. Executive Officers 2015 Base Salary
(Source: Kite Pharma Inc. DEF-14A 2016)

Kite 2015 Peer Benchmark Companies		
ACADIA Pharmaceuticals	Agios Pharmaceuticals	Alnylam Pharmaceuticals
Bluebird Bio	Celldex Therapeutics	Clovis Oncology
Dyax	Halozyne Therapeutics	Intercept Pharma
Juno Therapeutics	Neurocrine Biosciences	NewLink Genetics
Ophtotech	Portola Pharmaceuticals	Puma Biotechnology
Seattle Genetics	TESARO	Ultagenyx Pharmaceutical

Table 3. 2015 Benchmark Peer Group
(Source: Kite Pharma Inc. DEF-14A 2016)

Annual Bonus Opportunities:

An annual bonus is awarded to individual executives based on their contribution toward the annual corporate goals. The goals set for FY2015 are outlined in Table 4. The amount awarded to each executive is based on how successfully these goals were achieved. Kite Pharma's management was able to meet and exceed the goals set for FY2015, and the executives were therefore awarded the amounts shown in Table 5.

Corporate Goals	Weighted	Specific Goals
Progress KTE-C19 to Multi-Center Clinical Trials	60%	<ul style="list-style-type: none"> Initiate Zuma-1 in Q2 2015 Advance Zuma-1 in Q4 2015 Begin 2nd Trial in Q4 2015
Advance Clinical and Commercial Manufacturing Capabilities	35%	<ul style="list-style-type: none"> Establish clinical suites and validate manufacturing facility Meet timelines and budget for construction of commercial manufacturing facility
Grow Pipeline via In-Licensing or Acquisitions	5%	<ul style="list-style-type: none"> Hire senior executives to lead manufacturing operations Complete one additional partnership Establish European Subsidiary

Table 4. Annual Bonus Opportunity Goals for FY2015
(Source: Kite Pharma Inc. DEF-14A 2016)

Named Executive Officer	Base Salary	Target Award Amount	Approved Award Amount	Annual Bonus Received
Arie Belldgrun	\$500,000	50%	140%	\$350,000
Cynthia Butitta	\$375,000	50%	133%	\$200,000
David Chang	\$375,000	50%	133%	\$200,000
Helen Kim	\$350,000	50%	136%	\$190,000
Jeffrey Wiezorek	\$328,750	50%	125%	\$123,640

Table 5. Executive Officers 2015 Annual Bonus Award
(Source: Kite Pharma Inc. DEF-14A 2016)

Long-Term Incentive Compensation:

Long-term incentive compensation is granted in the form of equity awards, both common shares and restricted stock units. Executive officers are awarded stock options when they are first hired, and thereafter at the discretion of the compensation committee. Equity awards may be granted when an officer is promoted, or to award exceptional performance. Executive officers are eligible to receive a mix of 70% common shares and 30% restricted stock units, which vest 25% annually over four years. Currently, none of the officers have a contract that dictates they will receive stock options annually, making these awards solely performance based. All named executives were awarded stock options for FY2015 (Figure 14).

Named Executive Officer	Options to Purchase Shares of Our Common Stock (#)	RSU Awards for Shares of Our Common Stock (#)	Equity Awards (Aggregate Grant Date Fair Value)
Arie Belldgrun	100,700	28,200	5,841,641
Cynthia M. Butitta	66,100	18,500	3,833,805
David Chang	66,100	18,500	3,833,805
Helen S. Kim	153,000	9,200	5,861,263
Jeffrey Wiezorek	26,400	7,400	1,059,279

Figure 14. Long-Term Incentive Compensation
(Source: Kite Pharma Inc. DEF-14A 2016)

Overall, the executive's compensation plan appears balanced and designed to increase shareholder value given the specific goals of progressing the pipeline and achieving FDA approval (Table 4). The base salaries are evaluated against a comparable group of peer benchmark companies and the annual bonus opportunity awards are connected to a series of goals designed to propel the company forward. The long-term

incentive plan could benefit from a similar list of long-term goals that management expects to achieve. This would help shareholders determine where the company sees itself in the future and would encourage management to outline how they hope to achieve these goals. Figure 15 shows a summary of management's compensation for FY2015.

Name and Principal Position	Year	Salary (\$)	Bonus (\$)(1)	Stock Awards (\$)(2)	Option Awards (\$)(3)	Non-Equity Incentive Plan Compensation (\$)(4)	All Other Compensation (\$)(5)	Total (\$)
Arie Belldgrun, President and Chief Executive Officer(6)	2015	500,000	—	1,801,134	4,040,507	350,000	13,246	6,704,887
	2014	387,225	—	—	15,444,419	300,000	34,149	16,165,793
	2013	160,417	—	—	384,503	—	27,687	572,607
Cynthia M. Butitta, Chief Operating Officer and Chief Financial Officer(7)	2015	375,000	—	1,181,595	2,652,210	200,000	4,688	4,413,493
	2014	352,083	150,000	—	7,749,837	225,000	—	8,476,920
David Chang, Chief Medical Officer and Executive Vice President, Research and Development(8)	2015	375,000	—	1,181,595	2,652,210	200,000	4,688	4,413,493
	2014	218,750	—	—	6,182,900	87,123	200	6,488,973
Helen S. Kim, Executive Vice President, Business Development	2015	350,000	—	587,604	5,273,659	190,000	4,375	6,405,638
Jeffrey Wiezorek, Senior Vice President, Clinical Development	2015	328,750	—	472,638	1,059,279	123,640	4,175	1,988,482

Figure 15. Overview of Executive Compensation

(Source: Kite Pharma Inc. DEF-14A 2016)

Insider Shareholders and Trading:

There are no surprises or red flags when we look at the top shareholders for Kite Pharma (Figure 16). The CEO, Dr. Arie Belldgrun, is the 7th top shareholder and owns approximately 4.68% of shares. This is an encouraging sign, indicating that the CEO believes strongly in the company's ability to bring their products to market. Similarly, there are no insider trades that indicate management is losing faith in the company's ability to succeed (Figure 17).

KITE PHARMA INC CUSIP 49803L10

1 Current 2 Historical 3 Matrix 4 Ownership Summary 5 Insider Transactions 6 Options

Search Name All Holders, Sorted by Size 21) Save Search 22) Delete Search 23) Refine Search

Text Search Holder Group All Holders Allocate Multi-Managed

24) Color Legend Shrs Out 49.9M % Out 97.76 % Float 81.63 SI % Out 17.47

Holder Name	Portfolio Name	Source	Opt	Position†	% Out	Latest Chg	File Dt
1 CAPITAL GROUP COMPANIES INC	Multiple Portfolios	13F	All	9,505,523	19.06	793,170	09/30/16
2 BLACKROCK		ULT-AGG		3,037,427	6.09	136,191	09/30/16
3 VANGUARD GROUP		ULT-AGG		3,034,136	6.08	98,730	09/30/16
4 JPMORGAN CHASE & CO		ULT-AGG		2,608,076	5.23	-560,180	09/30/16
5 BONDERMAN DAVID		Form 4		2,360,034	4.73	0	06/01/16
6 WILDCAT CAPITAL MANAGEMENT	WILDCAT CAPITAL MANAGE	13F		2,358,084	4.73	0	09/30/16
7 BELLEDEGRUN ARIE S		Proxy		2,333,079	4.68	0	04/01/16
8 ALTA PARTNERS		Form 4		1,761,957	3.53	0	06/01/16
9 STATE STREET CORP		ULT-AGG		1,583,520	3.17	152,391	09/30/16
10 FMR LLC		ULT-AGG		1,262,173	2.53	-1,053,755	09/30/16
11 MENORA MIVTACHIM HOLDINGS L	MENORA MIVTACHIM HOLDI	13F		1,008,899	2.02	324,000	09/30/16
12 COMMERCIAL STREET CAPITAL LL		Form 4		946,420	1.90	0	06/01/16
13 BB BIOTECH AG	BB BIOTECH AG	13F		800,000	1.60	50,000	09/30/16
14 WADDELL & REED FINANCIAL INC		ULT-AGG		715,700	1.43	715,700	09/30/16
15 BAINCO INTERNATIONAL INVEST	BAINCO INTERNATIONAL I	13F		671,540	1.35	647,750	09/30/16
16 CITY NATIONAL BANK	CITY NATIONAL BANK	13F		620,635	1.24	470,129	09/30/16
17 T ROWE PRICE GROUP INC		ULT-AGG		521,568	1.05	281,826	09/30/16
18 VIKING GLOBAL INVESTORS LP	VIKING GLOBAL INVESTOR	13F		516,815	1.04	-2,008,682	09/30/16
19 HIGHLINE CAPITAL MANAGEMENT	HIGHLINE CAPITAL MANAG	13F		505,400	1.01	505,400	09/30/16

Figure 16. Kite Pharma's (Nasdaq: KITE) Top Institutional and Insider Shareholders
(Source: Bloomberg Terminal; Command < OWN>; Accessed 12-8-16)

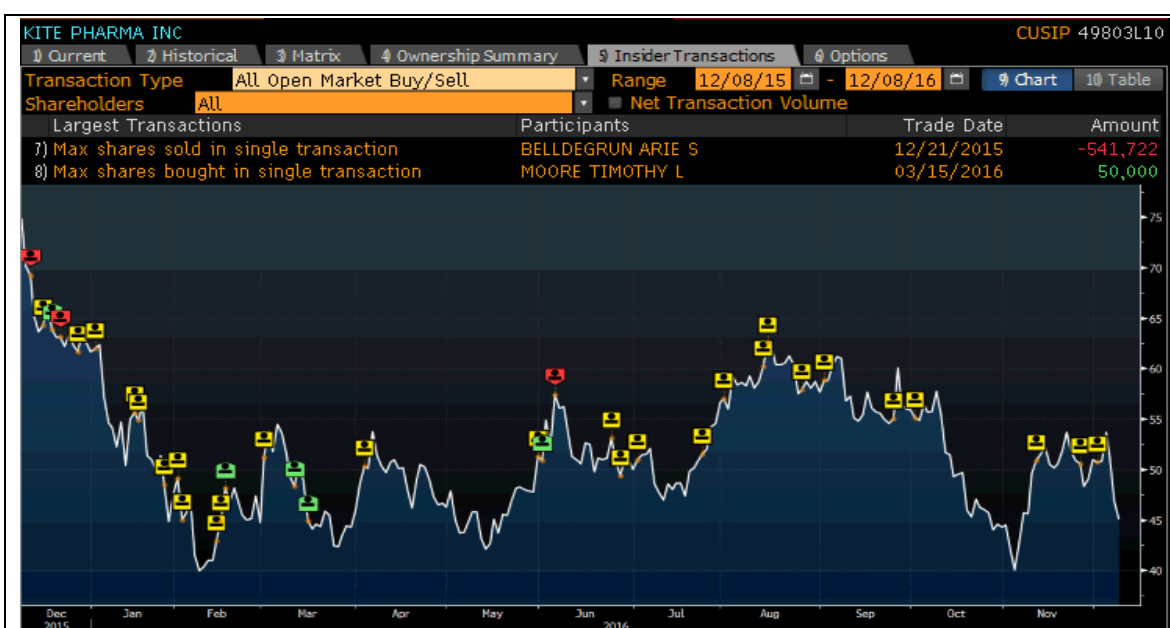


Figure 17. Kite Pharma's (Nasdaq: KITE) Recent Insider Transactions
(Source: Bloomberg Terminal; Command < GPTR>; Accessed 12-8-16)

Conclusions:

Using a proprietary discounted net present value (NPV) model along with market insights, we have concluded that Kite Pharma is undervalued with a potential upside of 89.25% based on the target price of \$85.30. We recognize that there is uncertainty regarding the FDA approval process and there is no guarantee that KTE-C19 will become FDA or EMA approved for any of the indications included in the model. However, we have accounted for the risk of failure by conducting a Monte Carlo simulation using the historical probabilities of success based on the clinical stage of the FDA approval process for each of the indications. Thus, KITE represents an investment with significant risk-reward asymmetry. Additionally, Kite Pharma's management team is highly experienced with an excellent track record of bringing products to market. The company's management compensation plan appears to be balanced and sufficiently aligned with shareholder value creation. Additionally, management has recently made smart capital allocation decisions to ensure that Kite Pharma maintains a robust drug pipeline and is prepared for the commercialization of KTE-C19 immediately upon its anticipated FDA approval in late 2017.

Based on these findings, we recommend Kite Pharma, Inc. a **BUY** with a target price of \$85.30.

Appendix A: Collaborations and Partnerships

Kite Pharma's Collaborations and Partnerships	
National Cancer Institute	CRADAs for B-cell malignancies and HPV-associated cancers
Netherlands Cancer Institute	Kite will be given the exclusive option to license multiple T-cell receptor gene sequences for development and commercialization
Adimab	Discovery and optimization of fully human antibodies against CAR targets
Alpine Immune Sciences	Exclusive licensing agreement to use AIS' transmembrane protein technology
Amgen	Research and develop novel CAR T-cell therapies
Bluebird Bio	Advance second generation TCR product candidates against HPV-16 E6
Cell Design Labs	Develop next generation CAR T-cell products that incorporate molecular "on/off switch" technology
Genentech	Evaluate the efficacy of KTE-C19 in combination with atezolizumab (anti-PDL1 antibody) in patients with refractory NHL
General Electric	Next generation functionally integrated and automated manufacturing system for engineered T-cell therapy
Vitruvian Networks	Design and develop a platform for patients, physicians and treatment centers that enables commercial scale ordering, logistics, monitoring and delivery of T-cell therapies
Leiden University Medical Center	Identify and develop TCR product candidates targeting solid tumors associated with HPV-16 infection
Leukemia & Lymphoma Society	Enhance the development of KTE-C19 in refractory NHL and to launch CAR T therapy educational programs
Tel-Aviv Sourasky Medical Center	Develop new CAR T-cell therapies for various tumor types
UCLA David Geffen SOM	License agreement to acquire rights to develop and commercialize off the shelf allogeneic T-cell therapies

Table 6. List of Kite Pharma's (Nasdaq: KITE) Collaborations and Agreements, and a Brief Description of the Objective of Each Partnership
(Source: Kite Pharma Inc. (2015) 10K)

Appendix B: Beta Distributions

α and β Values for KTE-C19 Approval					
	Mean	Standard Deviation	Variance	Alpha	Beta
FDA: DLBCL	0.9	0.1	0.01	7.2	0.8
EMA: DLBCL	0.6	0.1	0.01	13.8	9.2
FDA: ALL	0.25	0.1	0.01	4.44	13.31

Table 7. The Values α and β Used to Generate the Beta Distributions for KTE-C19
(Results were calculated in the “Alpha-Beta Values” tab of the accompanying spreadsheet)

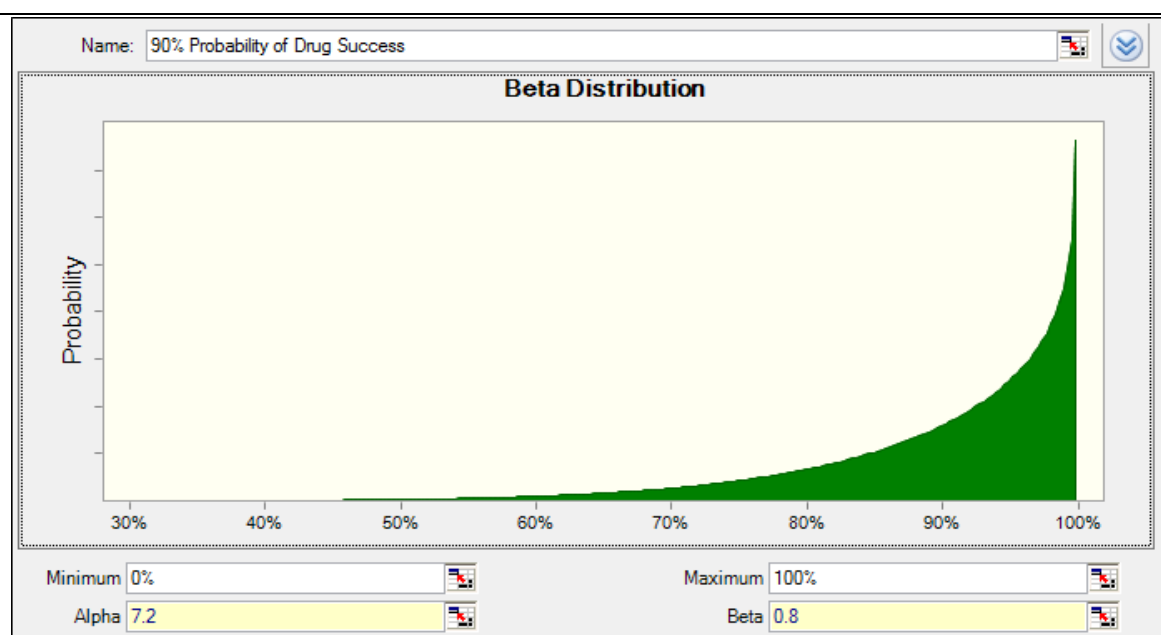
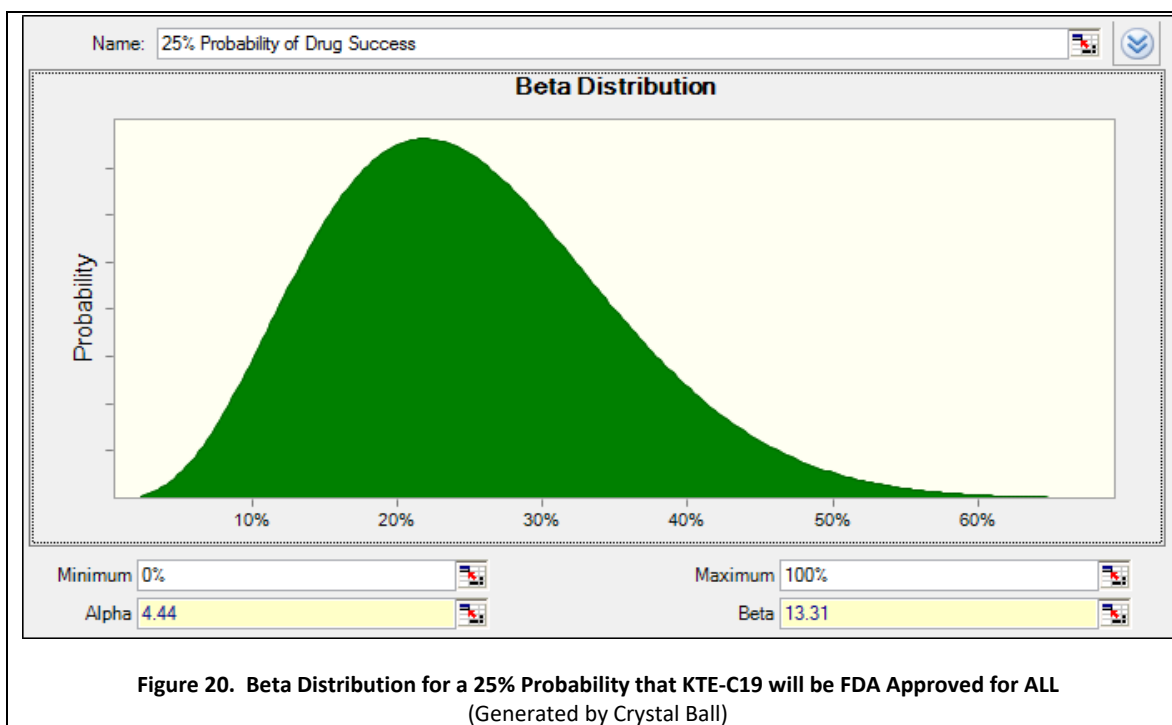
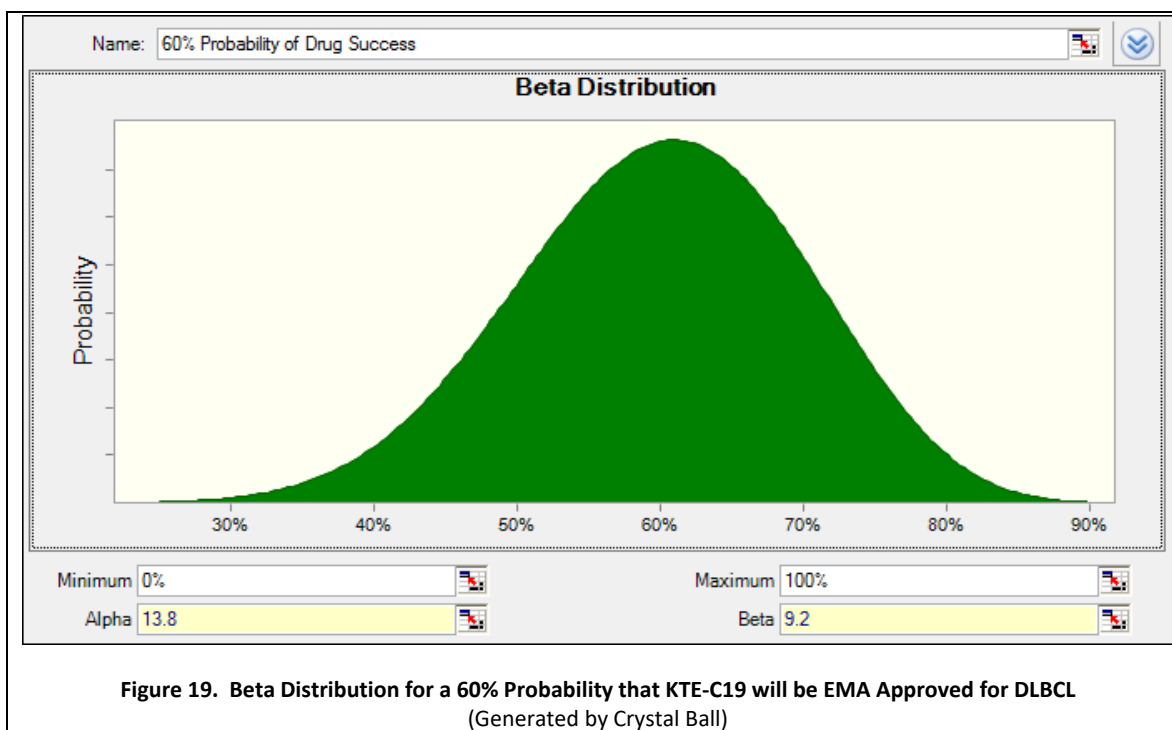


Figure 18. Beta Distribution for a 90% Probability that KTE-C19 will be FDA Approved for DLBCL
(Generated by Crystal Ball)



Appendix C: Analyst Recommendations

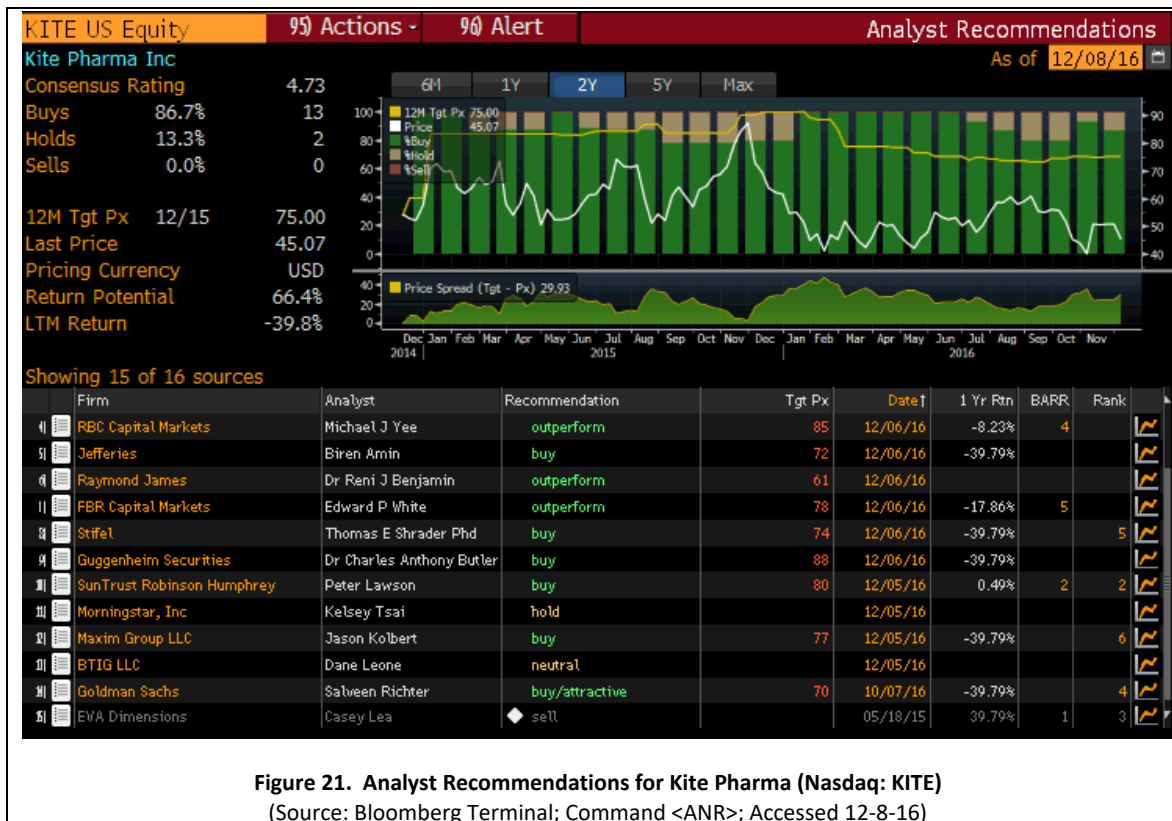


Figure 21. Analyst Recommendations for Kite Pharma (Nasdaq: KITE)
 (Source: Bloomberg Terminal; Command <ANR>; Accessed 12-8-16)